Referring now to FIGURE 2, an intracavity ultrasound probe 30 for three dimensional imaging which is constructed in accordance with the present invention is shown. The probe 30 includes a handle section 36 by which the user holds the probe for manipulation during use. At the rear of the handle is a strain relief 18 for the probe cable (not shown). Extending from the forward end of the handle 36 is the shaft 32 of the probe which terminates in a dome-shaped acoustic window 34 at the distal end through which ultrasound is transmitted and received during imaging. Contained within the distal end of the shaft is a transducer mount assembly 40 which is also shown in the uncovered view of the tip assembly of FIGURE 3. A convex curved array transducer 46 is attached to a transducer cradle 48 at the distal end of the assembly 40. The transducer cradle 48 is pivotally mounted so it can be rocked back and forth in the distal end of the probe and thereby sweep an image plane through a volumetric region in front of the probe. The transducer cradle 48 is rocked by an oscillating drive shaft 50 which extends from a motor and shaft encoder in the handle 36 to the transducer mount assembly 40. The drive shaft extends through an isolation tube 52 in the shaft which serves to isolate the moving drive shaft from the electrical conductors and volume compensation balloon 44 located in the shaft proximal the transducer mount assembly 40. The construction and operation of the rocking mechanism for the transducer cradle 48 is more fully described in concurrently filed US patent application serial number 10/599,306, entitled ULTRASONIC INTRACAVITY PROBE FOR 3D IMAGING, the contents of which are incorporated herein by reference. The echo signals acquired by the transducer array 46 are beamformed, detected, and rendered by the ultrasound system to form a three dimensional image of the volumetric region scanned by the probe.

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Amend the paragraph beginning on page 5, line 19 to read as follows:

Because ultrasonic energy does not efficiently pass through air, the array transducer 46 is surrounded by a liquid which is transmissive of ultrasound and closely matches the acoustic impedance of the body which is approximately that of water. The liquid is contained within a fluid chamber 42 inside the transducer mount assembly 40 which also contains the array transducer 46. Water-based, oil-based, and synthetic polymeric liquids may be used. In a constructed embodiment silicone oil is used as the acoustic coupling fluid in the transducer fluid chamber. Further details of the fluid chamber of the embodiment of FIGURE 2 may be found in concurrently filed US patent application serial number 10/599,317, entitled ULTRASOUND PROBE WITH MULTIPLE FLUID CHAMBERS, the contents of which are incorporated herein by reference.

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IN THE CLAIMS:

Amend the claims to read as follows:

1. (original) An ultrasonic probe including a transducer located at a distal end of the probe, the transducer being moved within the chamber to scan an image region outside the probe, comprising:

a fluid chamber enclosing the transducer within the probe;

an acoustic fluid which is highly transmissive of ultrasound located in the fluid chamber; and

a thin-walled volume compensation balloon formed of a high performance thermoplastic material in fluid communication with the fluid chamber, the volume compensation balloon containing a small fraction of the fluid of the fluid chamber at room temperature.

2. (original) The ultrasonic probe of Claim 1, wherein the thin-walled balloon is formed of a non elastomeric thermoplastic material.

3. (original) The ultrasonic probe of Claim 2, wherein the thin-walled balloon exhibits a low permeability to the acoustic fluid.

4. (original) The ultrasonic probe of Claim 3, wherein the thin-walled balloon exhibits a high compliance over the designed temperature range of transport and use.

5. (original) The ultrasonic probe of Claim 4, wherein the thin-walled balloon exhibit a high thermal stability and is operated at or below the glass transition temperature for the thermoplastic material.

6. (original) The ultrasonic probe of Claim 1, wherein the acoustic fluid comprises a silicone oil.

7. (original) The ultrasonic probe of Claim 1, wherein the non elastomeric thermoplastic material comprises a PET polymer.

8. (original) The ultrasonic probe of Claim 7, wherein the thin-walled balloon exhibits a high burst strength.

9. (currently amended) An ultrasonic probe including a transducer located at a distal end of the probe, the transducer being moved within the chamber to scan an image region outside the probe, comprising:

Deleted: The ultrasonic probe of Claim 1,

a fluid chamber enclosing the transducer within the probe;

an acoustic fluid which is highly transmissive of ultrasound located in the fluid chamber; and

a thin-walled volume compensation balloon formed of a high performance thermoplastic material in fluid communication with the fluid chamber, the volume compensation balloon containing a small fraction of the fluid of the fluid chamber at room temperature,

wherein the thin-walled balloon exhibits a high compliance of less than 2 psi per ml; a low permeation rate to acoustic fluid of less than 1.0; a high burst strength in excess of 10 atmospheres; and a thermal stability which does not significantly decrease compliance at low temperatures of operation.

10. (original) An ultrasonic probe for three dimensional imaging comprising:

a probe body enclosing a fluid chamber;

an array transducer movably mounted within the fluid chamber;

a drive mechanism coupled to the array transducer to move the array transducer during scanning;

an acoustic fluid located within the fluid chamber; and

a volume compensation balloon in fluidic communication with the fluid chamber, the balloon being formed of a substantially non elastic material and being partially expanded at room temperature.

11. (original) The ultrasonic probe of Claim 10, wherein the balloon is approximately half filled with acoustic fluid at room temperature.

12. (original) The ultrasonic probe of Claim 11, wherein the balloon contains less than 20% of the fluid of the fluid chamber at room temperature.

13. (original) The ultrasonic probe of Claim 10, wherein the balloon is formed of a high performance thermoplastic.

14. (original) The ultrasonic probe of Claim 13, wherein the balloon is formed of a PET polymer.

15. (original) The ultrasonic probe of Claim 10, wherein the compliance of the wall of the balloon is substantially constant over a design temperature range of transport and use.

16. (original) The ultrasonic probe of Claim 15, wherein the design temperature range of use extends below 0°C.

17. (original) The ultrasonic probe of Claim 10, wherein the wall thickness of the balloon is less than 1.0 mil, and

wherein the wall of the balloon exhibits a low permeability to the acoustic fluid.

18. (original) The ultrasonic probe of Claim 10, wherein the probe body comprises a shaft designed for intracavity use of the probe.